



NASA STTR 2015 Phase I Solicitation

T6.01 Gas Sensing Technology Advancements for Spacesuits

Lead Center: JSC

Space suit life support systems are critically necessary for the successful support of the International Space Station (ISS) and future human space exploration missions for in-space micro-gravity EVA and planetary surface operations. NASA has experienced a history of failures with the existing carbon dioxide (CO₂) gas sensor for the current Extravehicular Mobility Unit (EMU) due to excess moisture in the suit. In addition, NASA is presently developing an Advanced EMU (AEMU) for exploration missions. These missions will require a robust, lightweight, and maintainable Portable Life Support System (PLSS). The PLSS attaches to the space suit pressure garment and provides approximately an 8 hour supply of oxygen for breathing, suit pressurization, ventilation; humidity, trace- contaminant, carbon dioxide (CO₂) removal; and a thermal control system for crew member metabolic heat rejection. Innovative technologies and technology advancements are needed for the partial pressure gas sensors in the PLSS. Therefore, based on current and future EVA applications, advanced CO₂ gas sensing methods are needed that can tolerate ~100% oxygen, direct water contact (Relative Humidity 0-100%), 3-23.5 psia operating pressures, and CO₂ ranges of 0-30mmHg. Additional attributes needed include low mass and volume, low maintenance, and radiation hardened or radiation tolerant. Integration of other sensing capabilities such as ammonia (NH₃ 0-50 ppm) and oxygen (0-100%) is desirable.